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SEPTEMBER SPARTAN SCHOOL---AIR CORPS P.T. AT TULSA MUNICIPAL AIRPORT 1939

Southern Flight

The Birdmen's Perch

We were looking through some of our mail the other night when the thought struck us to take a census. Believe it or not, the last 200 letters included some 39 states, the District of Columbia, Hawaii, Ontario, British Columbia, Saskatchewan, Quebec, England, and Cuba with the long distance honors divided between J. A. O'Brien of New Delhi, India and Jack Millar of Melbourne, Australia, who live exactly 8,550 and 11,500 miles from here, respectively. *Gentlemen and scholars all!*

MAJOR AL WILLIAMS, alias "Tattered Wing-Tips,"
Mgr. Gulf Aviation Products, Gulf Bldg., Pittsburgh, Pa.

A MARK OF PROGRESS

Headline flights—or at least most of 'em—are fine things. They serve indispensably to make flying a part of people's everyday conversation. And to hasten the day when it will become part of everybody's life.

But once in a while we mutter a little into our beard because some vital happening has not the news quality it should. For instance, we feel that the whole world should know that Pennsylvania-Central Airlines recently received the first permission from the CAA to operate their 550 H. P. Wasp engines 700 hours between major overhauls!

To our mind, that's news! It's a joint tribute to PCA's operation and maintenance procedure, to Pratt and Whitney who made the engines, and to Gulf whose aviation gasoline and patented Alchlor process Gulf Airline Oil—the commercial twin of Gulfpride—is used in every PCA plane.

It is this unique Alchlor process—used in addition to conventional methods—that digs down far deeper into the 100% Pure Pennsylvania . . . gouges out up to 20% more motor-gumming dirt and sludge. And which, in the first year, PCA used Gulf products, substantially cut their oil costs.

MENTAL GYMNASTICS

This month we have two head-scratchers, one easy, one a little harder.

No. 1—A mechanic reaches into a dark locker to get a pair of socks. There are in the locker 25 pairs of red, 25 pairs of white, and 25 pairs of blue socks all

jumbled up. How many socks does he have to pull out to make sure he has two that match?

No. 2—Take as a premise, first, that all trees have one or more leaves, and, second, that there are more trees in the world than there are leaves on any one tree. Does it follow that any two of all the trees must have the same number of leaves? Can you prove it one way or the other?

(Don't lie awake nights wondering if your answers are right. We'll be glad to mail you the official solutions. Just send your answers to T.W.T. to be checked.)

THIS MONTH'S WHOPPER

Dear Major:

A couple of years ago in Knox County, we were having a terrible drought. Hadn't seen any rain for a coon's age.

On one of those days that'd singe the hair off'n a dog's back, I decided to go to town for a quart of ice cream. On the way, I had to cross Pope Creek—a nice sized stream that's always had plenty of water.

As I was driving across the creek the darn bridge collapsed. And down I fell to the creek bottom.

Well, sir, I was slamming it through the gears trying to get out when the blame buggy ran out of gas. Luckily I had a pint of Gulf Aviation Gas under the seat that I used for a fly spray on picnics.

I poured the G.A.G. in the tank and stepped on the starter—you know, Major, that ark went down the creek like a bat out of the hot place, throwing water 70 miles in every direction.

It did such a good job of throwing water that nary a drop was left in the creek but the crops were saved from drought.

Robert Cowles

Gulf Oil Corporation and Gulf Refining Company . . . makers of

GULF **GULF AVIATION PRODUCTS**

STINSON FEATURES "*Goodrich Safety*" IN NEW 1939 MODELS

NEW 1939 STINSON "RELIANT"
Hand in hand with the new beauty and styling of this "Reliant" is an even greater measure of engineering achievement. More speed, more pay load, new fingertip control and many other features make it the finest "Reliant" offered in Stinson's history.

25 New Improvements Offered in Famous Stinson "Reliants". . . With Extra Protection of Goodrich Tires and E.T.* Brakes for Safer, Smoother Landings

• Again Stinson makes top-flight news! With a new, faster "Reliant" that is attracting admiration from coast to coast. Although re-styled from nose to tail and built with 25 definite new improvements, the 1939 "Reliant" retains all the proved Stinson advantages—including the use of Goodrich Airplane Silvertowns and the new Goodrich E. T.* Brakes.

"Teamed" together, this new tire, tube and brake combination gives Stinson owners extra safety and smoothness on all landings. And because this new Goodrich E. T.* Brake has the simplicity of only three basic elements—the expander tube, the brake block, and the retractor spring—Stinson owners avoid time-killing, costly brake repairs.

Give your next planes the benefits of this safer, smoother landing control. Write Dept. 690, Aeronautical Division of The B. F. Goodrich Co., Akron, Ohio, for complete information about Goodrich Airplane Silvertowns and the new Goodrich E. T.* Brakes.

***Expander Tube**

NEW 1939 STINSON "105". Another outstanding example of Stinson craftsmanship. Although priced low, the Stinson "105" is equipped with slots, flaps and other features that are usually found only in planes costing much more. Delivers 25-miles-to-the-gallon automobile economy!

★NOT A SINGLE BRAKE PART REPLACED!

Read This Remarkable Record of Trouble-Free Service With Goodrich E.T.* Brakes

Arthur Thompson, Manager, Service Dept., Stinson Aircraft Division of Aviation Manufacturing Corp. writes, "We have nearly 400 hours on one of our factory 'Reliant' demonstrators and a little over 300 hours on another. There hasn't been a single part replaced in the entire system of both airplanes and no adjustment has been made since the planes were built. We have used these two airplanes for demonstration work for a total of 25 months without touching the system except during periodic inspections. That, in my language, is service from a wheel and brake."

Goodrich *Airplane* Silvertowns

THE SAFEST AIRPLANE TIRE EVER BUILT

Over 40 Rubber Products for Airplanes — including Tires — Tail Wheels — Abrasion Shoes — DE-ICERS — Matting — Rubber Hose — Grommets — Shock Absorber Cord — A Complete Line of Rubber Aeronautical Accessories.

Southern Flight

SEPTEMBER, 1939 VOL. XII, No. 3

The complete monthly digest of aeronautics in the South and Southwest.

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★ ★ ★ ★ ★ Just Among Ourselves ★ ★ ★ ★ ★

WAR

THERE is no getting away from the impressive fact that World War II spells immediate expansion for the American aircraft industry. To what extent no one can predict, but already one thing is certain—the impetus is being felt in every phase of the aviation industry. It is to be seriously hoped that the expansion taking place will be orderly, carefully planned on sound economic grounds with the thought always present that the War may not be of long duration. Mushroom growth can end only in violent collapse.

We can expect to see not only widespread expansion within the healthy ranks of our well established manufacturers, but also the springing up of various and sundry new enterprises that hope to get in on the swelling orders from domestic and foreign sources.

Although the European war will provide the principal cause for what lies immediately ahead in our industry, we must not lose sight of the fact that both commercial air transport and non-commercial, private flying operations are stepping along in seven league boots. Right now military orders and expected military orders are eclipsing this remarkable and historical expansion in those elements of aeronautical science that apply to peace time operations; nevertheless a very major portion and to our mind the most important portion of aeronautical expansion revolves around the rapid development of the airplane as a modern, safe, comfortable and expeditious mode of travel—a common carrier, if you wish, for the use and benefit of modern civilization, far removed from military implication and identity.

Insofar as World War II goes, it is natural to beg the question: How will it affect our industry? First of all, the unprecedented demands upon the industry will show concrete beneficial results in scientific aeronautical progress to an extent we have never before known and upon which no dollar value can be placed. Think of the engineering research, design and testing that will automatically be brought about by these heavy demands for improved aircraft, engines, instruments, radio, accessories and all the many materials and gadgets that go into the modern airplane. Think momentarily of what volume orders will mean to speeding up and perfecting our methods of production, the contributions that will be made toward standardization in fabricated parts and processes of production.

Even though the War is a short one as many observers are inclined to predict, there is no doubt but that it will have two other definite effects upon our industry. We are practically guaranteed a powerful air arm for the defense of our own shores; and we are placed in an enviable position to regain our export markets, now that the belligerent nations are entirely out of the foreign trade field. Only gross stupidity could keep us from retrieving the wealthy export markets once held by the European nations. The opportunity is especially attractive in the Latin American countries, where the greatest competitive inroads were made, and where our greatest present and future export markets lie.

With full realization that this market does exist in the nations to the South, it remains for our aviation concerns to arrange for proper sales representation, provide for handling the financial phases of export trade, promote vigorous sales campaigns and work hand in hand with the Department of Foreign and Domestic Commerce and our State Department in building friendly and profitable trade relationships.

REVISION FOR THE G.H.Q.

With the Expansion Program Well Under Way, Air Force Development Enters a New Stage as Tactical Components Are Realigned for More Effective Striking Power.

Tom Ashley

THE General Headquarters Air Force is rapidly changing its form and substance into a unit capable of exerting air power over wide areas.

While its role, like that of the Navy, continues to be strategically defensive, new equipment will enable it to operate offensively for great distances in providing for our security against hostile attack.

Commenting upon the current expansion of the Air Corps, Major General Delos C. Emmons, commanding general of the GHQ Air Force, stated in an interview that large multi-engined aircraft, capable of operating aloft for many hours, together with quantities of smaller but exceedingly fast bombers of a new design, and pursuit are to be the backbone of the rejuvenated air arm.

The expansion program launched last July and now well under way provides for the all-around strengthening of American air forces, he said, but from the standpoint of military experts the most important accomplishment has been the widespread realization that bombardment aviation must have range as well as speed and firepower. The war abroad has brought this forcibly to the attention of the world.

Air force development has entered a new stage, General Emmons pointed out. Among several changes in the tactical setup are vital alterations in the branch known as attack. The type of equipment formerly employed by attack aviation has been virtually abandoned by the air force, which found its range and fire power unsuitable. In its place will be a new type of airplane designated officially as "light bombardment."

Thus attack aviation, which has been the subject of exhaustive research and experimentation for the last eighteen years, has given way to light bombardment. This new arm of the air force will still have as its primary mission the support of ground troops, but it will also be a better weapon for independent air operations. It will, by virtue of its greater fire power, be able to ac-

(Continued on page 18)

The Curtiss XSO3C-1, most recent experimental development of the Curtiss Aeroplane Division, Curtiss-Wright Corporation, is a mid-wing monoplane powered with a 12-cylinder Ranger, inverted "V" type, air-cooled engine. Developed primarily for operations off battleships and cruisers, the new plane carries a crew of two and may be interchangeably equipped either as a land plane or as a seaplane. After completion of current factory and flight tests, the scout-bomber will be flown to the U. S. Naval Air Station at Anacostia for acceptance trials.

TWO FACTORIES FOR DIXIE

What may turn out to be the first major step in a definite Southward movement of aircraft manufacturing facilities is seen in the construction of two airplane factories, one at Nashville and the other at Fort Worth.

Larry Fisher

MANY of us down here south of the Smith & Wesson line, especially those of us who are interested in a balanced economy for our preponderantly agricultural region, aren't very happy about the stigma given us by a lot of self-appointed saviors of the South, those products of a bungling Washington collectivism, who have generously dubbed us the Nation's No. 1 economic problem.

All of us are well aware that the South can stand some sound and modest industrialization to better balance our economic structure. But as one wiry observer puts it: "What we need is less sympathetic surveys and more new industries, and you can't get industry from a mess of college professor economists who are long on theory and short on horse sense. Wide-awake communities will have to bring industry in."

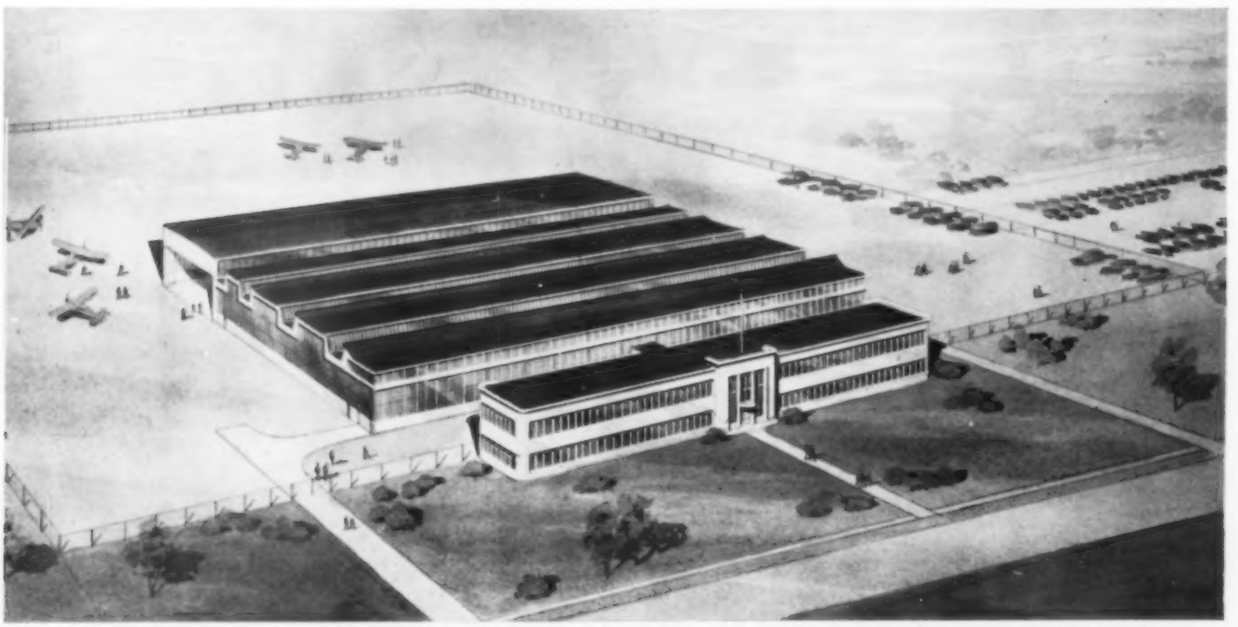
There is, then, little surprise in the fact that airfolk, business leaders and civic bodies in the southern half of the nation are about to declare a new Confederate holiday, stage a spectacular celebration and celebrate in ecstatic joy two recent announcements to the effect that a couple of airplane factories are moving in to live with us. This enthusiastic reception can be completely appreciated only by those of us who have longed for years to see a healthy aircraft industry settle and develop in Dixieland. We welcome them with open arms and hope that they are the pioneers of a general movement to bring all phases of aviation manufacturing enterprise into the world's most natural flying regions.

Aviation Manufacturing Corporation

At Nashville, the Aviation Manufacturing Corporation (Stinson, Lycoming, Vultee) is now building a large modern aircraft factory near the Nashville Municipal Airport, while the Bennett Aircraft Corporation will start production shortly in a new factory of 25,000 square feet two miles north of the Fort Worth Airport. With the exception of the colony at Wichita, Kansas, the Spartan factory at Tulsa and the Maryland factories, our regions have been relatively devoid of aviation manufacturing enterprises; yet the South's many advantages, as ostensibly recognized by two progressive companies now building factories, cry out for wider recognition, especially in the light of a much to be desired decentralization of the American aircraft industry.

AVIATION CORP.'S factory adjacent to the Nashville airport will add considerably to that company's production facilities. According to W. H. Beal, president, the entire unit will consist of 145,000 square feet divided as follows: Manufacturing unit, 125,000 square feet; administration and engineering offices, 20,000 square feet. Both will be air conditioned. The manufacturing unit will be 405 feet long and 300 feet wide. The administrative office and engineering building will be 240 feet long and 40 feet wide.

Albert Kahn of Detroit and Marr & Holman of Nashville, project architects, point out that due to the monitor type of construction, the daylight working conditions will prevail on the large floor areas of the factory at all times. Straight line production methods will be possible as all



Architect's Drawing Of The New Aviation Manufacturing Corporation Factory At Nashville, Tennessee.
Consisting of 125,000 square feet of floor space, this modern aircraft factory is situated on thirty-six acres of ground with plenty of room for expansion. President W. H. Beal of the corporation announced that Nashville was selected because of its inland location and ideal weather. Production in the new plant will be devoted to the manufacture of aircraft, parts and sub-assemblies.

incoming material after inspection will be so located that it will be worked directly into the production lines. The plant will have three different production lines which will terminate in the assembly portion of the manufacturing unit. The assembly division of the plant will be 125 feet wide and 300 feet long. Unobstructed doors, located at each end of the assembly division, will be 125 feet wide and 24 feet high.

Minimum clearance between spans in the factory is more than 100 feet, so when completed the plant will be able to take care of the largest type of aircraft production with ample room for the building of larger types as they develop.

A special electric heat treating and processing department will be an important feature of the manufacturing unit. Special sections have been set aside for sand blasting, painting, machine shops, storage and experimental departments.

Balconies will provide additional facilities for subassemblies of various parts and for storage of manufactured parts to be used as needed in the production lines. Wide concrete aprons will connect the factory with the Nashville Airport runways. Approximately 1,000 persons will be employed, Beal announced.

Bennett Aircraft Corporation

THE Bennett Aircraft Corporation factory, second of the year for Dixie's broad acres, selected the open plains of Texas for their manufacturing site. The offices and engineering quarters have been completed and construction on the main factory wing is well under way.

Patented concrete block type of construction is being utilized and the factory is so designed as to permit future expansion and enlargement with a minimum amount of trouble and no interference whatsoever with production. In addition, the concrete block type of building can be erected with great speed, officials pointed out, and the efficacy of such construction is apparent in the event of urgent necessity.

A large and well-drained landing field for exclusive use of the company's flying operations adjoins the factory on the southwest and affords an exceptionally good north-south runway path of approximately 3,000 feet in length.

Completion of the factory within the next three months will culminate two years of intense design, engineering, building and testing work on the original Bennett BTC-1 which recently received an Approved Type Certificate from the Civil Aeronautics Authority. *(Southern Flight*, August, 1938.) Constructed entirely of impregnated Bakelite plywood, the Bennett is a twin engine, mid-wing, eight-place airplane which may be used either commercially or converted into a light bomber or bi-motor trainer.

Although the original model is powered with two Jacobs L-5 engines of 300 horsepower, it is designed to mount engines rated at 450 horsepower for take-off. The company intends to adapt this type of impregnated plywood construction to other designs now in the engineering stage of development.

OFFICIALS of the company in making the original announcement of their plans, pointed out the many advantages of the plywood construction which included rapid forming of integral parts in panels by steam treatment, rapid assembly, and fire and moisture resisting qualities of the materials. In addition, they stated that with the exception of a few basic pieces of conventional aircraft manufacturing machinery, only a simple assortment of tools, jigs and equipment would be required for production, thereby simplifying the manufacturing process and adding further to rapidity of production. With the exception of a few highly specialized technicians, the bulk of the labor employed will be wood workers, thereby precluding the necessity of drawing on the already depreciated ranks of skilled aircraft metal workers. This factor represents a distinct value insofar as national de-

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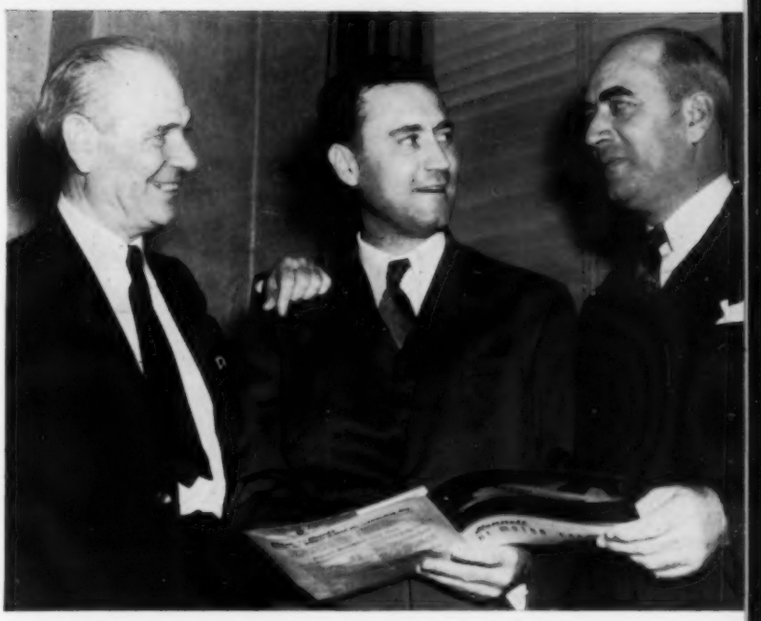
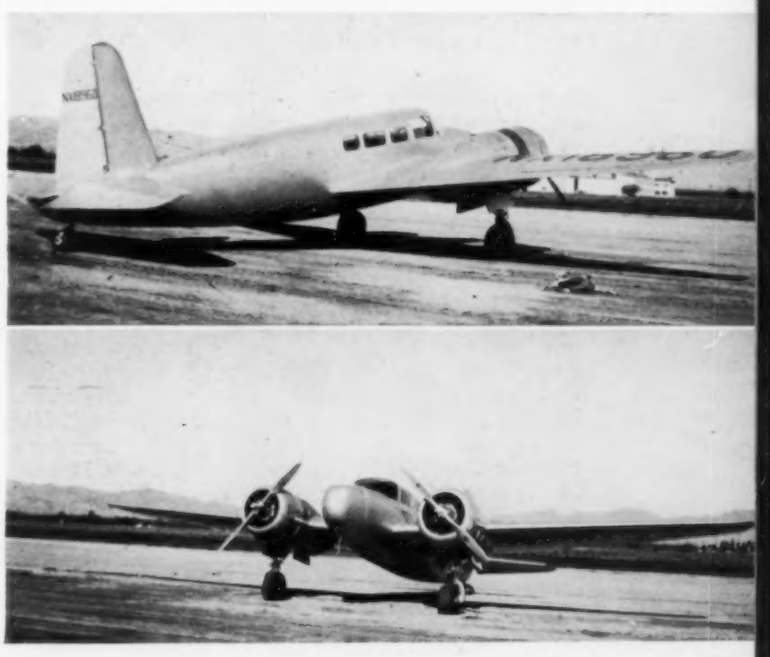


Executives of the Bennett Aircraft Corporation shown here, left to right, are: D. L. Johnson, F. C. (Bud) Merrill and John Kennedy. The factory now under construction two miles northeast of the Fort Worth Municipal Airport will consist of one main building 300 by 44 feet with two wings, each 100 by 60 feet. Production of the Company's bi-motor monoplane, which has received its Approved Type Certificate, is scheduled to begin sometime in December.

The original Jacobs powered Bennett BTC-1 is constructed of moisture proof, fire-resisting impregnated Bakelite plywood, and is equipped as an eight-place executive transport. Both commercial and military versions will be produced at the company's new factory near Fort Worth.



PROBLEMS OF SUBMERGED ENGINE INSTALLATIONS

Part I.

Wellwood E. Beall
Chief Engineer, Boeing Aircraft Company
and
E. G. Emery, Jr.
Chief of the Preliminary Design Unit
Boeing Aircraft Company

IT IS rather difficult at this time to ascertain whether or not all the problems with which we are confronted in laying out submerged engine installations are real or imaginary. We must contemplate the problems that we think exist and attempt solutions based mostly on our own past experience. Very few submerged engine installations have been designed, ground tested, or flown; therefore, actual experience is woefully lacking. The problems which we have encountered have been met while making preliminary designs of several types of advanced aircraft.

Inasmuch as most of the engines which are adaptable to submerged installations are in the design or experimental stages, and are, therefore, on the restricted list, we cannot, in this paper, make reference to any particular engine or installation; hence we must keep our comments in the general sense.

Wellwood E. Beall

Obviously, the primary object of submerged engine installations is to produce greater aerodynamic efficiency for the aircraft as a whole. The frontal area of the conventional engine nacelles is a very large part of the total frontal area of the airplane, and if eliminated by submerging the engines, improvements in the high speed and performance of the airplane will result. Nearly every other effect of these installations adversely affects the aircraft's performance, its maintenance, and its satisfactory operation. However, study seems to indicate at the present time that the final solution may be well worth the trouble.

The engines obtainable in this country suitable for submerged installation range from 17 inches to 27 inches in thickness, 44 inches to 57 inches in width, and 93 inches to 109 inches in length. The net volume of these packages is between 40 cubic feet and 97 cubic feet. These volumes appear quite small, but this is not the whole story. You will find that the exhaust ports on most of the new engines are located on the ends of the cylinders in such a manner that they tend to increase the size of the package. In many cases it has been necessary to add at least 8 inches to the thickness of these engines to take care of the exhaust collector stack and necessary shrouding for cooling. Including this increased dimension in the size of the engine makes their gross volume between 59 cubic feet and 123 cubic feet. In dividing these gross values into the maximum takeoff horsepower rating, we find that these engines have from 19 to 29 horsepower per cubic foot, or in other words a specific volume of .053 to .034 cubic feet her horsepower. Needless to say, this is a great deal of energy to be packed into such a small space, and the feeding, cooling, lubricating, mounting, and controlling of this concentrated energy becomes quite a problem. Some of these problems we hope to put before you for your consideration. We do not insinuate that we have the solution to these problems, but we believe that they are capable of solution.

The smallest engine in cubic size is not necessarily the most desirable. The most desirable engine is the one which can be enclosed in the smallest airfoil section for any given power. This means that the engine must have the proper ratio of gross thickness to length, in addition to being the smallest practical package in volume. Present day airplane design is directed toward increased speed and performance. This entails higher wing loadings with relatively smaller wings, and inasmuch as most engine installations are made in the wings, the size of the best aerodynamic wing may be too small for the engine. The result is that, particularly in high speed and long range aircraft, the parameter which determines the basic proportions of the wing is not aerodynamics, but the power plant installation. The wing must be designed first of all to enclose the power plant, then for its aerodynamic qualities.

This is a new situation, and we find that the thickness and length dimensions of the engines are of the utmost importance, because they determine the thickness and chord length of the airfoil section. This naturally makes it extremely difficult to design an aerodynamically good wing for high performance aircraft. The wing area tends to increase rapidly because the minimum chord is determined by the engine length. If the engine is too long for its thickness, then the airfoil section surrounding it will have poor spar depth and spacing, and there will be an excess of space above or below the engine; or if the engine is too thick for its length, the airfoil section is again affected adversely by the excessive thickness and consequent increase in frontal area or size. In a typical installation the engine is located between the spars in order to provide adequate support for the engine, and to utilize the maximum wing section depth. The optimum dimensions of the engine should be such that they should exactly fill the clearance space between the spars and between the upper and lower structural surfaces of a wing section of good aerodynamic characteristics. This would give the smallest airfoil section for a given engine installation. Inasmuch as there are innumerable possible variations and combinations, the engine manufacturer has a very difficult decision to make regarding the layout of his engine because his choice of overall outside gross dimensions determines to a great extent the size of the fundamental parts of the airplane.

THE installation of the engine inside the wing not only affects the aerodynamic form of the wing, it also affects its structure. The spar spacing not only affects the depth of the spars and their rigidity in bending, but the torsional

(Continued on Page 18)

Requirements for the lowest flying job in air transport are so rigid that only about one out of every twelve applicants are accepted for co-pilots school and about a third of the graduates are weeded out in the first year of actual flying.

Otis Bryan
Chief Pilot, TWA, Inc.

A SCARCITY of co-pilots appears to be developing in the air transport industry as a result of the expanding national defense program, but before the line begins to form at the right it might be well for prospective candidates to know some of the requirements for the job.

The gent who sits beside the man in the driver's seat of one of the big transcontinental airliners may seem to be just another handy man, but actually this is what he must have behind him in the way of experience:

Eight hundred hours of solo flying time, which means about three years of flying, before he can even apply for the job.

A valid instrument rating—which means he must be licensed by the Civil Aeronautics Authority to fly a plane on instruments only.

He must understand radio navigation and radio procedure in taking off and landing at any airport.

He also must have at least two years of work in an accredited college or university, plenty of personality, and he must be between 21 and 29 years old.

After that he can apply for a place in the T. W. A. co-pilot's training school and begin the job of learning how to be an airline captain. If he works hard for the next three or four years, he may get "checked out," which means he can be tested for his captain's ticket.

The average pilot accepted for enrollment in the TWA "Co-Pilots' School" already has put in nearly a full career learning to fly.

MOST of the airline pilots come from the Army or Navy, although we get a few fliers who have come up through private flying. We have taken on 62 new co-pilots since March 1 of this year, and nearly all are ex-service fliers.

AFTER qualifying for the co-pilot's school, the flier is put through an intensive two-weeks course, designed chiefly to give him instruction in T. W. A.'s particular flying procedure. He gets ten days in "ground school," in which he is drilled in the airline's procedure, and then is given two "student trips."

He flies as a third man in the cockpit on a scheduled flight, and watches the operations of the captain and regular first officer. Then he gets about five hours work in a "Link Trainer" which shows his ability to navigate a plane on instruments.

The "trainer" flight consists in working out a problem in navigation, and the maneuverings of the trainer, which is a replica of a cockpit anchored to the floor of the class-

(Continued on Page 18)

Applicant J. J. Thompson strips and has his blood pressure tested as a part of the rigorous medical examination prior to entrance in the co-pilots school.

The Lockheed Lodestar
With a top speed of 236 m. p. h., this fourteen passenger transport, largest of the Lockheed "family," weighs 17,500 pounds and boasts a non-stop range of 1150 miles at 218 m. p. h. cruising speed.

New Equipment Review

Lockheed Lodestar

TEST flights under the direction of Marshall Headle, veteran airman and chief of Lockheed's test pilot staff, have begun on a new commercial airliner, latest completed development of the Lockheed Aircraft Corporation.

Designated as the Lodestar, the new plane follows conventional Lockheed bi-motor design as illustrated in the accompanying photographs. It is a bi-motored monoplane affording accommodious accommodations for fourteen passengers and a crew of three. With a wing span of sixty-five feet, six inches, overall length is forty-nine feet, nine and seven-eighths inches. The cabin is twenty-four and one-half feet long and distance from roof to floor is six feet, three inches.

Carl B. Squier, Lockheed vice-president and sales manager, stated that the Lodestar has guaranteed itself a place among the fastest commercial planes in operation by virtue of its designed top speed of 236 miles per hour. The new transport weighs 17,500 pounds and will cruise non-stop for 1150 miles at a speed of 218 miles per hour.

First sale of the Lodestar was consummated shortly after initial flight tests with the signing of a contract for three of the 17-place airliners for Mid-Continent Air Lines of Kansas City. Total cost of the completely equipped order of three will approximate $250,000, according to Squier. Delivery is slated for next March when they will be placed in operation over the Mid-Continent routes from Tulsa to Minneapolis via Kansas City and Omaha.

The Mid-Continent Lodestars will be powered with Pratt and Whitney Hornets developing 1700 horsepower for take-off.

General data concerning the Lockheed Lodestar follows:

Wing Span	65′ 6″
Overall Length	49′ 9⅞″
Standard Gross Weight	17,500 Pounds
Weight Empty	11,170 Pounds
Standard Useful Load	6,330 Pounds
Engine Make and Model	Pratt & Whitney Hornet S1E3G Radial, aircooled, nine cylinder
Engine Horsepower	850 at 2500 RPM
Propeller	Hamilton-Standard Hydromatic constant speed, three-blade 10′ 6″ diameter
Maximum Speed at 7000 Ft.	240 MPH
Cruising Speed at 12,000 Ft.	220 MPH
Take-off run at sea level with flaps	860 Ft.
Take-off time at sea level without flaps	15 Seconds
Landing speed at sea level with flaps	65 MPH
Maximum rate of climb at sea level	1200 Feet Per Min.
Absolute Ceiling with 2 engines	23,000 Feet
Absolute Ceiling with 1 engine	8,500 Feet
Size of main wheel tires	15.00-16″
Retracting medium	Hydraulic
Retracting and locking time	10 Seconds
Full extension and locking time	10 Seconds
Maximum height inside of cabin (floor to roof)	6′ 3″
Maximum length inside of cabin	24′ 6″
Maximum width inside of cabin	65′ ½″
Normal Fuel Capacity (approx.)	644 Gallons
Normal Oil Capacity (approx.)	44 Gallons

Pratt & Whitney Double Wasp

ACCLAIMED as the most powerful aircraft engine for high altitude operations ever developed, the Pratt & Whitney "Double Wasp" made its bow to the public when the U. S. Navy recently put the engine on display at the New York Worlds Fair in the aviation building. The new engine is an 18-cylinder twin-row radial, rated at 1600 horsepower above 20,000 feet. Relatively small in diameter for its power, but considerably longer than the convention radial type, the "Double Wasp" is particularly adapted for "submerged" installations in the wings of high speed military and commercial type transports.

According to Leonard S. Hobbs, engineer-manager of Pratt & Whitney Aircraft, the engine achieves its greatest power output at high altitudes through the use of a special supercharger whose details have not been released by the Navy. The development has been fostered by the Navy Bureau of Aeronautics in cooperation with Pratt & Whitney engineers over a period of five years.

In announcing the new engine, Hobbs pointed out that the 1600 horsepower output at altitudes above 20,000 feet is equivalent to a power rating of more than 3000 horsepower at sea level in the conventional engine. Thus, without increasing the frontal area of the engine, a gain of 670 horsepower over what a similar engine of conventional type would produce, is achieved. Hobbs also explained that the conventional radial air-cooled engine, the lightest of all types now in service, weighs approximately 1¼ pounds per horsepower at sea level, but on the basis

of reduced power output above 20,000 feet, it weighs in the neighborhood of 2 to 2½ pounds per horsepower. The "Double Wasp" is slightly heavier at sea level but it weighs only about 1½ pounds per horsepower delivered above 20,000 feet. He expressed the belief that airplane speeds in excess of 400 miles an hour can be obtained with the new engine.

SYNTHETIC RUBBER HOSE

PERFORMANCE reports on a new type of airplane refuelling hose recently announced by the B. F. Goodrich Company reveal that development of a synthetic rubber-like substance has filled the need of the aviation industry for a hose made of material which will not deteriorate in the presence of gasoline and petroleum products.

Tests by major oil companies which have refuelling contracts at airports all over the nation have confirmed this characteristic of the hose, which is made of special inorganic synthetic rubber-like material.

The hose was developed over a five-year period of research, to provide a substitute for hosing made of natural rubber hose which, being an organic vegetable matter, has a tendency to disintegrate in contact with certain oils. It was felt that the possibility of small particles flaking off and passing into the motors constituted a menace despite the strictest possible precautions.

An added feature of the new hose is the incorporation of safeguards against dangers due to stored up static electricity which is generated in the plane by the flow of air across the surfaces of the plane in flight. Woven into the sturdy braid of the hose is special rust-proof stranded stainless steel wire. Thus, when the plane is being refueled, any static electricity which may exist is conducted harmlessly to the ground through the wire and couplings.

ELASTIC STOP NUT

THE Elastic Stop Nut Corporation has announced, in addition to its standard line of self-locking nuts, a new Elastic Stop Nut.

This new development incorporates a resilient non-metallic collar which takes up all thread play, thus establishing a constant thread contact which holds the nut in position on the bolt regardless of vibration or wear of surrounding parts. They were developed originally for pneumatic tools and other apparatus subject to heavy vibration, and are now widely used on mechanical equipment in every industry.

These nuts can now be furnished on order in any metal and in any combination of style, size, and thread system.

HYDRAULIC SELECTOR VALVE

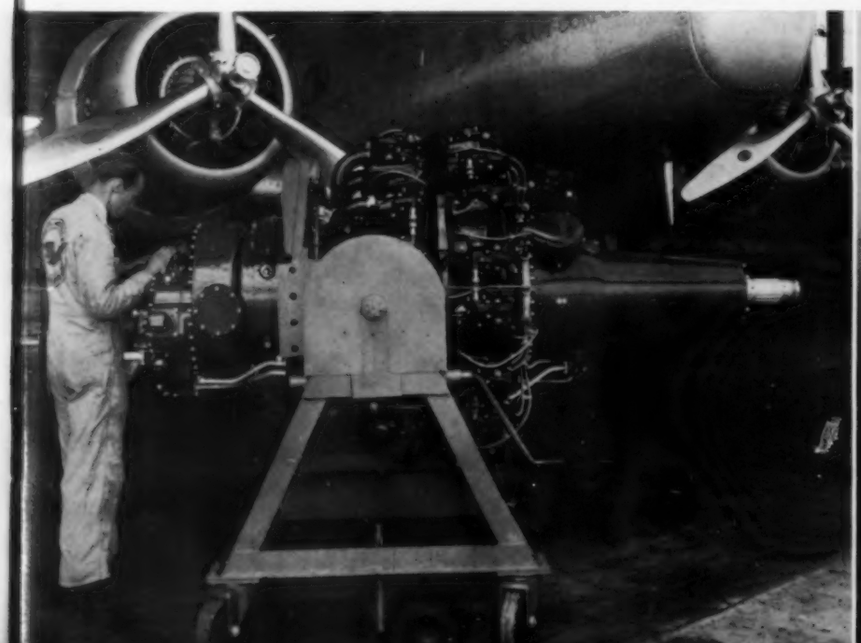
THE Aircraft Accessories Corporation has announced the completion of a new model hydraulic selector valve, known as No. 62008. Improvements in this model include the incorporation of a variable flow governor and pressure governor. The flow governor is of particular importance in that it controls the volume of oil delivered to each end of the actuating cylinder for controlling the extension and retraction time of the flaps.

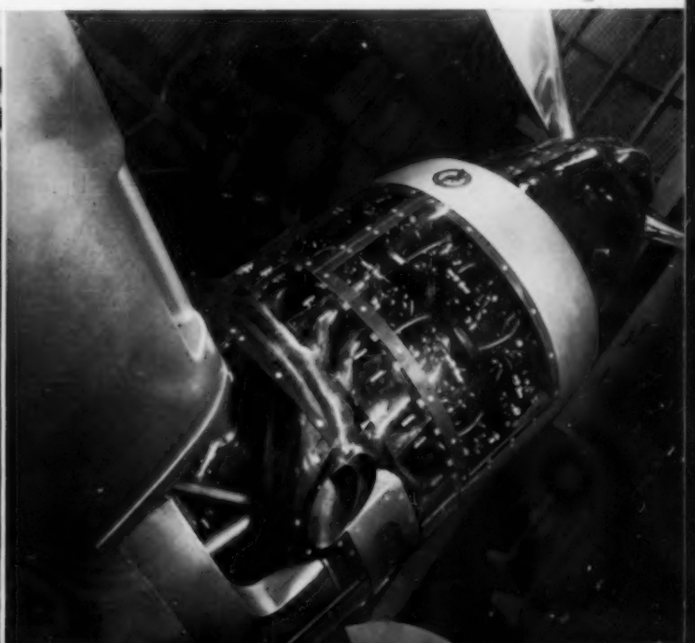
The pressure governor, built into this compact unit, has two functions, both of which contribute to the efficiency and safety of the aircraft. First, since engine driven hydraulic pumps deliver between three and four gallons of fluid per minute and since it is only necessary to use a part of this amount to complete the extension of the flaps in a given time, the pressure governor performs an important function in returning the excess fluid to the fluid reservoir through the pressure control valves.

The volume used and returned is governed by the size of the actuating cylinder in relation to work or force required to actuate the flaps at a given airplane speed.

The flaps are ordinarily designed to withstand a maximum air speed of 120 to 150 miles per hour. The actuating cylinder is designed to extend the flaps at this speed at a given hydraulic pressure. This pressure is controlled by the pressure governor in the new selector valve, and at any speed in excess of the design load of the ship, the pressure governor allows the fluid to return to the reservoir and the flaps remain closed until the speed of the airplane is lowered to the safe load of the flaps. This provision holds equally well for a reserve situation where the flaps may be extended and the speed of the plane increased beyond the safe load of the flaps, the pressure governor then allowing the flaps to close automatically.

The Pratt & Whitney "Double Wasp"
Rated at 1,600 horsepower above 20,000 feet, equivalent to a power rating of more than 3,000 horsepower at sea level in the conventional engine, this powerful Pratt & Whitney Wasp is an 18-cylinder twin-row radial, using a special supercharger for high altitude operations. The "Double Wasp" was placed on public display for the first time by the U. S. Navy at the New York World's Fair.





News of the Month in Review

MANUFACTURERS

Lockheeds to South America

● The Lockheed Aircraft Corporation announced recently the sale of two Lockheed 14 transports to the national air line of Venezuela—Linea Aeropostal Venezolana—for approximately $180,000, including engines and spare equipment.

Previously the South American company, which is subsidized by the Venezuelan government, has purchased six smaller Lockheeds for its various passenger services between the main cities of the country. The planes now on order are 11-passenger types powered by Wright Cyclone engines. They will augment the fleet of Lockheed Electras which has been operated over the system for the last two years.

Robert E. Gross, president of Lockheed, said both planes will be completed within 90 days. They will be delivered by air via Mexico, Central America, the Canal Zone and across a portion of the Carribbean to Caracas. Performance of the trim mid-wing transports will probably enable the Venezuelan line to reduce considerably flying time over its scheduled routes.

With its two engines producing 1520 horsepower for continuous operation, the Lockheed 14 has a maximum speed of 243 miles an hour and will cruise 1590 miles nonstop, with full complement of passengers and cargo, at a speed of 225 miles per hour. The plane is also capable of carrying its provisional gross weight of 17,500 pounds to a sub-stratosphere ceiling of 23,100 feet.

Thousandth Cub Delivered

● An event in significance in the annals of private flying demonstration sponsored by the Ppier Aircraft Corporation occurred early in August in many points of the country, with the production of 1000 "Cub" Sportplanes during the first eight months of 1939, a record never before equalled by a single airplane manufacturer.

T. V. Weld, vice-president of the Piper Corporation, stated that in one Iowa city a "Cub" was given away to the lucky ticket holder during an air meet on this occasion and at Dows, Iowa, The Dows Commercial Club awarded a free Cub during its Aviation Jubilee. Among other points and participants in this celebration were: Houston, Texas, by J. L. Schrader; Sterling, Colo., Stirling Airways; Hightstown, N. J., A. B. Bennett; Hagerstown, Md., Spring Green, Wisc., McBoyles Riverside Airport; St. Louis, Mo., St. Louis Flying Service; Baltimore, Md., John Hinson; Mobile, Ala., Oak Air Service.

A total of 181 "Cub" sportplanes were manufactured and sold during July, 1939, it was disclosed recently by W. B. St. John, Salesmanager of the Piper Corporation. This constitutes an increase of 151 per cent over Cub production during July, 1938. At present approximately 500 persons are employed at the Piper factory. Officials stated that present backlog of unfilled orders is sufficient to guarantee maximum production for the next two months.

New Assembly Plant for Vega

● As a major step in its preparation for quantity production of the Starliner transport, the Vega Airplane Company has occupied a new $30,000 hangar, it was announced early in August by Mac Short, president of the company.

The building, which adds 11,500 square feet of new floor area to the manufacturing division of the company, is a corrugated steel structure with sawtooth skylight roof. A mezzanine floor 15 feet above the main floor at the rear of the building is used by several minor assembly departments.

The new hangar adjoins the sheet metal fabricating departments where ten additional Starliners are now in the process of construction. President Short said work was progressing satisfactorily on the ten planes which will be identical to the prototype now undergoing preliminary flight tests. Upon approval of the prototype by the Civil Aeronautics Authority, quantity production will be started immediately, he said. The first ten airplanes have been contracted for sale to various airlines and individuals in the United States and several foreign countries.

The first Starliner will be submitted to the Civil Aeronautics Authority for additional tests to prove its suitability for airline use. These tests will be conducted on the routes of Mid-Continent Airlines between Kansas City, Minneapolis and Tulsa, Oklahoma.

The Starliner is a development of the Vega Airplane Company, a subsidiary of the Lockheed Aircraft Corporation, and the Menasco Manufacturing Company, which produced the UNITWIN engine used to power the plane. It is a six-place, low-wing monoplane equipped with tricycle landing gear. Design and manufacture of the plane is based on the most advanced practices known to the aeronautical sciences.

Monocoupe Announce Deliveries

● The Monocoupe Corporation of Robertson, Mo., reports the sale of another 90-A Deluxe model to R. L. Attkisson of Indianapolis, Ind., this being the second Monocoupe purchased by Atkisson since July.

Charles B. Smith of Indianapolis has also purchased a 90-A model to be used for sales demonstration work in Marion County, Indiana, for which he acquired a dealership.

Sam Wise of Kankakee, Ill., took delivery of a new 90-A Deluxe model recently and will work the surrounding territory as a newly appointed dealer.

James Michaels of Houston, Texas, took delivery of a new Monocoupe while at the Cleveland Air Races. He plans an extensive advertising campaign in the Texas territory in connection with his sales activities.

M. Sidney Morrison of Newton, North Carolina, acquired a 90-A Deluxe model recently, and will use his plane for business and pleasure flying.

H. Eichhammer, Salesmanager of the Monocoupe Corporation, is on an extensive sales demonstration trip in the eastern part of the country.

Fairchild Merger Likely

Sherman M. Fairchild, president of Fairchild Engine and Airplane Corporation, announced recently that final action required for the purpose of merging with its airplane manufacturing subsidiary, Fairchild Aircraft Corporation, and its engine manufacturing subsidiary, Ranger Engineering Corporation, was favorably taken at a meeting of the stockholders of Fairchild Aircraft Corporation held recently. Accordingly, Fairchild Engine and Airplane Corporation will acquire the operations and physical properties of its two principal subsidiaries and, in additon to simplifyng the intercorporate structure, it is believed that savings in taxes and other expenses will result.

Duramold Aircraft Corporation (formerly Clark Aircraft Corporation), a fully owned subsidiary which developed a semi-plastic material and process and controls several patents for molding airplane parts or units, is not included in the merger and will continue as a separate subsidiary.

Mr. Fairchild also stated that F. A. Galligan, vice-president and general manager of Fairchild Aircraft Corporation, had been elected vice-president of Fairchild Engine and Airplane Corporation, and will act as executive assistant to the president. Mr. Galligan has been connected with the various Fairchild enterprises for seven years and for the past two years has had charge of all airplane manufacturing activities.

Dividend Announced by Air Associates

● At a meeting of the Board of Directors of Air Associates, Inc., held recently at Garden City, N. Y., the following dividends were announced:

The regular quarterly dividend of $1.75 per share on the first preferred ($7 Cumulative and convertable) stock of the corporation, payable September 25, 1939, to stockholders of record September 18, 1939.

The payment date of this quarterly dividend was advanced, as in the previous year, from October 2, 1939, to September 25, 1939, to provide an additional dividend-paid credit within the corporation's fiscal year ending September 30, 1939.

The regular quarterly dividend of 12½c per share on the Common stock of the corporation payable September 25, 1939, to stockholders of record September 18, 1939.

Borg-Warner Reports Dividend

● At a meeting of the Board of Directors of Borg-Warner Corporation held recently in Chicago, Ill., a dividend of twenty-five cents (25c) per share was declared on the common stock.

This dividend is payable October 1, 1939, to stockholders of record at the close of September 19, 1939.

Aircraft Precision Backlog at Peak

● Orders totaling approximately $250,000 have been received by Aircraft Precision Products, Inc., during the past ten days, it was announced recently by C. A. Herberts, president. This gives the company a total backlog of $438,000, the largest in its history.

The new contracts were received from Vultee, Glenn L. Martin and Curtiss Aircraft and were for landing gear struts and hydraulic aircraft equipment.

R. A. Lawson, chief engineer for Aircraft Precision Products, Inc., who has just returned from a three-week tour of eastern aircraft manufacturing plants, reports that business expected to materialize from eastern aircraft producers in the near future assures capacity operations for the company throughout 1940. This is in addition to similar business expected from aircraft plants in Southern California which have not yet released orders on large new contracts received by them.

In order to handle the company's increasing volume of business a

partial double shift is now in operation at the plant and a full double shift of eight hours each is expected in the near future, according to Mr. Herberts. During the past nine months the company has already increased substantially its machine equipment which places it in an excellent position to handle the increasing volume.

SCHEDULED AIR TRANSPORT

Gains Reported by TWA

● Continued popularity of vacation travel by air during August aided in establishment of the sixth consecutive month of increased business for Transcontinental and Western Air, Inc., and a gain of 58.1 per cent in passenger miles flown over August, 1938, it was announced recently by V. P. Conroy, vice-president in charge of traffic and sales.

The coast-to-coast airline reported that 10,231,353 revenue passenger miles were flown during the month compared to 6,469,993 revenue miles registered in the same month last year.

The August total of passenger miles flown also bettered July's previous summer high of 9,926,238 miles, by 3.07 per cent.

Marked increases for August were shown in air mail and air express over the TWA line. Express pound miles for August totaled 71,936,038, an increase of 32.38 per cent over the 54,342,078 pound miles flown during July. The August express figures were even higher compared to August, 1938, when only 53,231,680 pound miles were flown. Air mail pound miles during August totaled 250,901,139, an increase of 6.07 per cent over the 236,548,260 pound miles flown in July. In August, 1938, 224,302,794 pound miles were flown.

"American tourists have established new records in airline patronage throughout the summer," said Conroy. "Following high August increases, the first day of September was the greatest single day for traffic in the ten-year history of TWA. On that day, preceding the Labor Day holiday, a total of 520,762 seat miles were flown. The previous record day was June 30, when 501,000 seat miles were flown."

The record-shattering traffic leads to TWA confidence that commuter and intercity plane schedules will be continued into the winter months in addition to coast-to-coast, New York-Chicago and Pittsburgh-New York flights.

World Record for American

● Establishing a new world's record for traffic over a domestic airline in a single month, American Airlines, Inc., flew 20,085,134 revenue passenger miles and transported 54,122 revenue passengers in August.

Traffic figures released by Charles A. Rheinstrom, vice-president in charge of sales, show that American Airlines broke its previous record set last June when 54,042 revenue passengers were carried and the air line flew a total of 19,993,352 revenue passenger miles.

In revenue passenger miles American recorded an increase of 52.7 over August 1938 and 4.1 per cent over July this year. Revenue passengers carried were up 53.7 over August, 1938, and 5 per cent over July this year. The airline's load factor was 66.4 per cent as compared with 56.1 per cent in August, 1938, and 65.5 per cent in July.

Heavy increases in passenger traffic on all American Airlines' routes were recorded in August as compared with August, 1938, and July this year.

Based on revenue passenger miles the Chicago-Detroit-Buffalo-New York route gained 50.9 per cent over August, 1938, and 3.5 per cent over July this year; New York-Los Angeles, 47.4 and 3 per cent; Boston-Providence-Hartford-New York, 56.1 and 7.1 per cent; Boston-Syracuse-Rochester-Buffalo-Erie-Cleveland, 3.7 and 11.8 per cent; 2.5 per cent, and Chicago-St. Louis-Tulsa-Oklahoma City-Dallas-Fort Worth, 79.6 and 4.6 per cent.

Braniff Tops All Previous Records

● Passenger traffic over Braniff Airways during August reached a new high, Braniff vice-president, Charles E. Beard, Oklahoma City, has announced. Operating a total of 1,804,230 passenger miles, revenues exceeded July, 1939, by 4.9 per cent and topped August, 1938, by 38.2 per cent.

Increasing traffic gains were given as reason for Braniff's recent announcement of the investment of over $500,000 in new equipment. Cleveland-Columbus-Dayton-Cincinnati-Louisville-Nashville, 47.2 and Four new, 21-passenger "Super B-Liners" will be placed in operation on the airline's Chicago-through-Texas route late this fall, Beard said, to accommodate further anticipated increases in passenger traffic.

Air Express Shipments Up

● Air express shipments over the Railway Express system for July totaled 63,529, an increase of 22 per cent over July, 1938, the air express division of the company reported recently. Gross revenue for the month was up 26.5 per cent, the report said.

Substantial Earnings for C & S

● After twenty months of consistent profit showing, Chicago and Southern Air Lines, Inc., operating between the Great Lakes and the Gulf Coast, announced today net earnings of $69,595.76 for the fiscal year ending June 30, after all charges and taxes were reported.

The statement showed earnings equal to more than two and one-half times annual requirements on the preferred stock. In the previous fiscal year, the airline earned $13,074, equal to 37 cent per share on the preferred.

Chicago and Southern recently placed an order amounting to more than $700,000 with the Douglas Aircraft Corporation for six new 21-passenger planes. Delivery will be made in March and the new equipment will be placed in service on April 1 between Chicago and New Orleans.

New Equipment for Eastern

● To take care of increasing demand for direct air passenger service without change of plane between New York and Brownsville, Texas, Eastern Air Lines has placed an order for three Douglas DST sleeper planes, Capt. E. V. Rickenbacker, president and general manager, has announced.

Eastern Air Lines connects with Pan American Airways at Brownsville on the international border, for Mexico, Central America and South America.

Costing $122,000 each, the sleeper planes will accommodate 14 passengers.

New High for Northwest Airlines

● Northwest Airlines showed an increase of 97.2 per cent in the number of passengers carried during the month of August 1939 over the same period a year ago, according to an announcement by Croil Hunter, president of the company. Passenger revenue increased 70.2 per cent. Passenger traffic over Northwest Airlines has shown steady increases during the past year; and August was the largest month in its history.

The company's rapid growth is reflected in an increase of 139 per cent in passengers carried as compared with August 1935. With the first few days of September showing even greater increases, indications are that this month will set a new all-time "high" in the number of revenue passengers carried, Mr. Hunter stated. The company is now flying a fleet of seven 21-passenger Douglas transports representing a cost of approximately $1,000,000.

Increase in C & S Traffic

● Chicago and Southern Air Lines, Inc., flew 5,563,982 revenue passengers miles during the first eight months of 1939, an increase of 29.7 per cent over the same period of 1938, when the airline flew 4,291,237 miles. D. D. Walker, vice-president, announced that during the period from January 1 to August 31, 1939, a total of 14,084 revenue passengers were carried against 11,047 for the same months in 1938. This is an increase of 27.5 per cent.

The total number of passengers carried in August 1939 showed an increase of 5.3 per cent over July of the same year and 23.4 per cent increase over the month of August 1938. The company flew a total of 818,501 revenue passenger miles in August 1939 against 796,754 in July 1939 and 625,648 in August 1938.

Chicago and Southern also announced the purchase of six new 21-passenger Douglas DC-3 planes costing more than $700,000. The new ships will be delivered during the month of March and will be placed into service on April 1. The new equipment will be used on the Company's route between the Great Lakes and the Gulf. Weighing 12 tons, the new Douglases will have a wing spread of 95 feet and will measure 64½ feet from nose to tail, and 17 feet from the top of the fuselage to the wheels. They will have a cruising speed of 190 miles an hour and a top speed of 215 miles per hour.

HUMBLE
HUMBLE AVIATION PRODUCTS
Reliable Flight Companions

Theon Wright | T. B. Wilson | Chas. H. Longwell | Manly E. Lord

PERSONAL NOTES

● Expansion of Transcontinental & Western Air's entire news bureau system, including the appointment of THEON WRIGHT as system manager with headquarters in Kansas City, has been announced by V. P. Conroy, vice-president in charge of traffic and sales.

Wright, former newspaperman with the United Press and for the past six months manager of the TWA news bureau in New York City, will succeed C. W. DAYHOFF, former system manger, who is moving to Los Angeles to take charge of the Pacific Coast news division.

● Announcement that T. B. WILSON, former railroad and shipping executive, will remain with Transcontinental & Western Air, Inc., as chairman of the board of directors was made recently by Jack Frye, President of the airline.

Mr. Wilson announced his intention of resigning from TWA last April when the Lehman Brothers holdings in the airline were acquired by Mr. Frye, Paul E. Richter, executive vice-president and their associates, but Mr. Frye's statement said that Mr. Wilson had been persuaded to remain permanently with the airline.

● CHARLES H. LONGWELL, Chief Inspector of the Curtiss Aeroplane Division of the Curtiss-Wright Corporation, recently received a "25-year diamond pin" in recognition of his record of a quarter century of service with that organization.

In 1914, at the age of 20, he joined Glenn H. Curtiss at Hammondsport, N. Y., when the latter was busily building several now famous aeronautical types, the flying boat "America," the first U. S. Army Air Corps tractor plane, forerunner of the "Curtis Jenny," and the Curtiss OX engine.

● Two important organization changes in the General Electric Company were announced today by W. R. Burrows, vice president in charge of manufacturing, in the appointment of MANLY E. LORD of Schenectady as manager of the Fort Wayne works to succeed NEIL CURRIE, JR., who is relinquishing his position to become assistant to the vice president in charge of manufacturing. These appointments are effective immediately.

● Appointment of LEONARD A. SCHUTTIG as Chief Engineer of the Thomas L. Siebenthaler Manufacturing Company, manufacturers of aircraft radio transmission and receiving equipment as well as a line of specialized de-icing devices and service equipment, was made public in Kansas City by Robert S. Van Cleve, General Manager. Schuttig was formerly employed by the Bendix Radio Corp., as Chief Engineer in charge of radio development projects, and in that capacity gained national recognition for his outstanding activities in the design and engineering of aircraft radio. He is a graduate of M. I. T., with degrees in electrical and communication engineering.

● Appointment of GEORGE W. LUSK as T. W. A. district traffic manager at Albuquerque, a post he formerly held for four years before transferring to the west coast, was announced recently by V. P. Conroy, vice-president in charge of traffic and sales. Lusk replaced MALCOLM BOSS, who resigned last month.

At the same time, two other important shifts in traffic personnel were announced. These included the appointment of CLYDE S. FULLERTON as Hollywood manager to replace George Lusk, and the promotion of JOSEPH W. LETZKUS, Los Angeles traffic and sales representative, to Fullerton's vacated post as Southern California manager.

● The INSTITUTE OF THE AERONAUTICAL SCIENCES has elected the following aeronautical engineers as Fellows of the Institute:

J. L. ATWOOD, Vice President and Chief Engineer, North American Aviation, Inc., Inglewood, Calif.; DON R. BERLIN, Chief Engineer, Curtiss Aeroplane Division, Curtiss-Wright Corp., Buffalo, N. Y.; J. P. DEN HARTOG, Associate Professor of Mechanics, Harvard University, Cambridge, Mass.; HALL L. HIBBARD, Vice President and Chief Engineer, Lockheed Aircraft Corp., Burbank, Calif.; ROBERT INSLEY, Chief Research Engineer, Pratt & Whitney Aircraft, United Aircraft Corp., East Hartford, Conn.; CAPT. S. M. KRAUS, USN, Head of Material Division, Bureau of Aeronautics, Navy Department, Washington, D. C.; WILLIAM LITTLEWOOD, Vice President in charge of Engineering, American Airlines, Inc., Chicago, Ill.; ROBERT J. MINSHALL, Chief Engineer, Boeing Aircraft Co., Seattle, Wash.; MAC SHORT, President, Vega Airplane Co., Burbank, Calif.; DONALD H. WOOD, Aeronautical Engineer, National Advisory Committee for Aeronautics, Langley Field, Va.

Ten Fellows of the Institute are selected from the membership each year in recognition of the valuable contributions they have made to the aeronautical sciences. They will be presented with their certificates of Fellowship on Honors Night which the Institute holds in January.

● BRUNO M. SMILING, widely known aviation manufacturing executive, has joined the plant organization of Kellett Autogiro Corp., Philadelphia, Pa., as factory manager, according to an announcement by Roderick C. Kellett, executive vice president. Mr. Smiling will be placed in full charge of planning and production in both the corporation's aircraft parts and autogiro manufacturing divisions, Mr. Kellett said.

The new official has been identified with the aircraft industry for many years, having been employed with Sikorsky Aviation Corp., for eight years as chief draughtsman, and with Fairchild Aviation Corp., as assistant chief of Production Engineering.

Mr. Currie started his service with the Company in 1908 in the employ of the power apparatus department of the Western Electric Company following his graduation from the University of Minnesota as an electrical engineer. With the purchase of that department by the General Electric Company, Mr. Currie joined the motor department of General Electric, then located at the Pittsfield works.

IT PAYS TO FLY

K. L. M. Royal Dutch Continues Service

● Contrary to reports issued in the United States that K. L. M. Royal Dutch Air Lines, Holland, had discontinued all of its services, the following statement has been issued by this company:

Until further notice, the Amsterdam-Batavia Line of K. L. M. Royal Dutch Air Lines will be operated twice weekly from Naples to Batavia on Monday and Thursday, and twice weekly from Batavia to Naples, leaving Batavia Monday and Thursday.

On the European services, two services a day are being operated from Amsterdam to Copenhagen and Malmo, Sweden; three services weekly from Amsterdam to Christiansand and Oslo; and three services a day from Amsterdam to Brussels. All other services in Europe have been canceled until further notice.

The services in the West Indies, including the new line from Curacao to Paramaribo, will continue to operate according to schedule now valid, while future expansions can be expected and will be announced in due time.

Ports of Call

Correspondence from the Airports and Airways

Brownsville, Texas

Overnight Visitors Numerous

One morning when we drove out to the Brownsville Airport we were surprised to see a flock of seven red, green and blue overnight arrivals nestled silently and tied down securely between the big silver Douglases of Braniff, Eastern and Pan American Airways.

One Fairchild belonged to M. F. Clark, Aeronautical Inspector.

The second Fairchild was piloted by Joe Shumate, C. A. A. Senior Aeronautic Inspector, from Love Field, Dallas, Texas.

G. S. Cassidy, C. A. A. Air Carrier Inspector, was in a Beechcraft, accompanied by A. F. Nolty, C. A. A. Inspector.

From Corpus Christi, E. C. Hubble came in his Cub on business. P. Dillard, also in a Cub, came from Harlingen, Texas.

Pilot Fischer came from San Antonio, in a Stinson belonging to Hangar Six, Inc., and a Mexican Government Stinson, piloted by Captain Cabanas was in from Mexico City.—*THEODORE C. PELIKAN.*

Coffeyville, Kansas

Junior College Approved Under CAA Program

Coffeyville is soon to have another airport, the new one to be a commercial field is being constructed on a 200 acre tract of ground two miles due north of the city, by Ray and Bill Jensen of the Jensen Bros. Manufacturing Company. Present plans call for the immediate construction of two five-plane hangars with a much larger hangar to be erected in the future. Three runways have already been sown with bermuda grass seed. These runways will vary in length from three thousand to four thousand feet in length. We'll have considerably more to report about this field later.

The Aviation Club has received a check from the Thunderbird Aviation Club for second prize for having the second largest number of ships present for their Sportsman's Air Show. Eight local ships attended the event.

The C. A. A. program is just getting under way here. Coffeyville Junior College has been approved for the program with Ralph Shenk as ground instructor and airport manager Lynn Berentz as flight instructor. Berentz has ordered a new Piper Cub for the flight training. Ten students will be trained, including one girl.

The Inman Bros. Flying Circus has returned here in their Boeing Tri-Motor from an all summer tour of the middle-west.

Hank Duncan has sold one of his Aeroncas to Mr. and Mrs. Archie McCunningham of Seden, Kansas. The McCunninghams are both learning to fly their ship which they are keeping at the local field.—*HAROLD E. HAGGARD.*

Enid, Oklahoma

Phillips College to Train Students

Since Woodring Field will be represented for the first time in Ports of Call, there are a few events of the past few months that merit being brought to the attention of the readers of SOUTHERN FLIGHT.

In June, Bill Vacin became the manager of Woodring Field. Bill came to Enid from Wichita, Kansas, where he had for the previous five years, operated a flying school there. Since Vacin came to Enid, flying activity has shown a considerable increase; having soloed twelve students since his arrival, three of which have already received their solo licenses. He now has about fifteen or twenty regular students under the C. A. A. Training Program.

The three students who have received their solo licenses are: Chas. Williams of the Oklahoma Highway Patrol (by the way, Charlie was recently trailing a "just married" sign), Leon Vance, a Junior High School Principal of Enid, and Phillip Rheese, drilling contractor of Garber, Oklahoma.

We just learned that the reason for the lapse in Gene McKnight's flying is due to an appendectomy. He says that he soon will be flying again.

Ted Anderson renewed his commercial license recently. Ted is a pioneer instructor of the old Jenny days. Tommy Green, President of the Enid Flying Club, has received his Limited Commercial ticket.

George Athey has been doing his part of cloud dusting with his white Monocoupe, as has Claude Palmer with his Porterfield.

Joe Durham of Okeene recently purchased a Wiley Post airplane.

A freak twister did considerable damage to the hangar recently and a Porterfield owned by the Woodring Flying Club. A Curtiss Robin belonging to Roy Morgan was damaged slightly.

Visitors during the past month include Arlene Davis, who placed fifth in the Bendix this year. Dale Myers of Tulsa, who pilots a Sparton belonging to the Tulsa Drilling Company, is a frequent visitor. Dale was Arlene Davis' technical advisor in the race. Others include Fred Cooper and a party from Tulsa, Lee Price and Ralph Stuart of Woodward, and John Erickson and Ralph Cooley of Ponca City.—*ERNIE McGEHEE.*

Joplin, Missouri

Local Junior College in CAA Program

Official information that the Joplin Junior College has been selected to participate in the aviation training program sponsored by the government has been received by A. E. Elliot, Superintendent of Schools. Tentative plans already worked out by school officials call for the establishment of both a ground school and flight school. Ground school courses to be conducted at the school and flight school courses to be conducted at the airport under the supervision of H. G. Harper. School officials are hopeful that the training can be extended to include establishment of an aviation mechanic's school at the airport.

Dr. De Tar has demonstrated that the Beechcraft "looks harder than it really is," so others are hopeful of logging a little Beech time, notably John Cairus of Riverton, Kansas, and Neil Ruff of Joplin.

We have been taught a lesson in diplomacy. A four year old and his daddy were looking the planes over several days ago. The little fellow was very eager to go up but astonishingly reluctant to beg. With big pleading eyes, he looked up and asid: "Please, Daddy, lift me up and let me see just how it is for sittin'." He got his ride.

We have a flying dentist now, and his wife is as interested as he. Dr. and Mrs. Faubion of Webb City, Mo.

Mr. Riley Hunt, a lawyer of Grove, Oklahoma, is a new student who realizes the possibilities of aviation in hs own busness. He plans to buy a plane soon.

The Beechcraft was chartered recently by Dr. Paul Jenkns of Lebannon, Mo., for an emergency trip to Texas, Nolan Junge of the Junge Baking Co., to Coffeyville, Kans., George Klingman of the Klingman Electrical Co., S. W. Shady, manager of the Goodyear Tire Co., and Neil Ruff of the Ruff Grocery Co., to Springfield, and Dr. Moody accompanied by a small patient to Kansas City.

Earl Bruton, Jr. is acquiring a little time now. His father was given a private ticket two years ago. First, father, and then son in this fascinating business of flying. Other new students from Joplin are: Albert Calbourn, L. L. Green, Mr. Harrison, Norman Stokes, F. M. McKinley, J. B. Mitchell, W. H. Martin, and Clyde Maxton. From out of town we have A. V. Bright, Grove, Okla., Rex Compton, Iantha, Mo., Larry De Vers, Carthage, Mo., Earnest Fegley, and Stewart Landrum, Baxter Springs, Kansas, Francis Swindell, Webb City, Mo., Bob Schifferle, Anderson, Mo., Dr. Westbrook, Columbus, Kansas, and Max Roark, of Anderson, Mo.—*HELEN HARPER.*

Lafayette, Louisiana

Training Program at Southwestern

A light bombing plane, a B10-B, from Barksdale Field, La., arrived with Lieut. W. V. Brown, Sergeants C. D. Crow, H. C. Moe, and Crew Chief Dugger. The crew will engage in photographic work in this section, with headquarters at the local port.

A number of airplane mechanics will take courses at Southwestern, under the supervision of Dean G. G. Hughes, of the College of Engineering. Equipment and parts for three planes will be furnished for study as well as other machinery necessary for the course. This subject is in addition to the C. A. A. school which has recently been established. Southwestern was recently chosen as one of the colleges in the South where the C. A. A. approved plans for flight and ground training instructions.

Randolph Briant, chairman, Junior Activities, reports two Junior Clubs organized; one under Club Adviser Cyril Gerac with 35 members and one under Club Adviser Francis Delhomme with 25 members. Competition activities between the two clubs is planned for a later date.

The Evangeline Chapter of the W. N. A. A. held a business meeting recently and ways and means were discussed for a membership drive and to stimulate interest in aviation.

Recent visiting pilots were: Ken Oliver, Dude Camden, Cecil Smith, J. M. Gester, Fortune Dugan, Eddie Ross, T. R. Young, Joe Shumate, M. C. Clark, Gerry Mulligan, Chas. M. Hutchinson, Buck Buchanan, Bob Wright, J. W. Marshall, Jack Shell, H. A. Bott, Ira Nelson, L. W. Long, Pete Burden, B. Dugan, C. S. Stovall, and Chas. M. Black.—*MRS. F. V. HUTCHISON.*

Miami, Florida

All American Air Maneuvers in January

The City of Miami has taken over the hangar formerly occupied by Karl Voelter, Inc., and is now handling all storage, and sale of gas at the field. Karl Voelter, Inc., still operates his flight school and aircraft parts and supply business, renting the necessary space from the city.

In addition to the Voelter operation, other operators working from the same hangar include Embry-Riddle, "Shorty" Hall, and Julian O'Neil. Several new hangars are anticipated on the field before the winter season is over.

Work on the new Master Airport is well under way, and the new field is expected to be completed by the winter of 1940-41.

A detachment from Langley Field, Va., has been camped on the present Municipal Airport for the past two months, occupying the entire South end of the field. Included in this outfit is some 150 officers and men and nine bombers plus utility ships, making a very imposing military spectacle. Up at the Navy Base, 21 cadets are daily winging their way around the circle in elimination flight training preparatory to finishing at Pensacola. The Navy Base now has a full program of traning for the next few years to come and those in the "know" say that the activities of the base will become more and more extended as time goes on.

We are of the opinion that the Navy would do well to consider Miami as one of their Chief training centers, not only for elimination and primary training, but for the advanced flying as well. We have the weather for 365 flying days a year, minus fog, and with excellent conditions from every standpoint.

Plans are well on the way for the coming All American Air Maneuvers, January 5-6-7, which from all indications point to the greatest show thus far, and from the standpoint of the aircraft owner and enthusiast, the greatest air show in America. Last year's influx of nearly 700 visiting ships for this event will probably be topped this year, and arrangements are being made to handle 1000 airplanes, so put those dates on your calendar. It will be a rip-roarin' show.

In closing we are happy to extend our heartiest felicitations to SOUTHERN FLIGHT for the new move to bigger and better quarters in Dallas, and to wish it every success it deserves.—*KARL E. VOELTER.*

New Orleans, Louisiana

New Orleans Flyer Sets Light Plane Record

Aviation officials from 27 states, members of the Civil Aeronautics Authority, and representatives of private interests gathered in New Orleans last month during the three-day convention of the National Association of State Aviation Officials. A large part of the discussions was aimed at establishing better co-ordination between state officers and the C. A. A.

Commenting on the possibilities of establishing feeder lines throughout the country, retiring president Charles L. Morris of Hartford, Conn., declared that present established air routes serve little more than one-fourth of the nation's population, often with unsatisfactory and infrequent service. He said that of the 4000 cities in the United States with a population exceeding 5000, there are only 210 cities—about five per cent—on the air lines.

He termed the operation of feeder lines as "most necessary to the expansion of aviation," and called upon the C. A. A. for a favorable decision in a pending test case involving an Eastern system.

In the course of the convention the association adopted a resolution calling for federal government participation in airport construction and urging more flexibility in C. A. A. regulations and increased cooperation on the part of its officials.

It advocated issuance by the C. A. A. of temporary permits authorizing operation of repaired planes until they could be examined by C. A. A. inspectors. Under the present set up damaged planes which have been repaired by qualified mechanics must remain grounded indefinitely until examined by federal inspectors.

The association expressed its desire to co-operate with the C. A. A. in the student pilot training program recently instituted in universities and colleges throughout the country, designed to turn out 11,000 pilots the coming year.

Henry B. Chapman, New Orleans flying instructor, set his Aeronca seaplane down on the dark waters of the Industrial Canal in New Orleans October 12 after a 1186 mile flight from Floyd Bennett field in New York, to break the light seaplane distance record.

In order to break the previous record of 898 miles, Chapman had to fly at least 62 miles, or 100 kilometers, over that distance. He covered the entire route in 13 hours and 30 minutes, his time cut down by bad weather. The total ditsance, he said, was 1186 miles, but he expected credit for only 1120 miles because of backtracking in Virginia to escape storms.

Chapman made the flight by way of Atlantic City, Richmond, Spartanburg, Atlanta and Mobile, the Eastern Airlines route. He said that he encountered bad weather almost continuously from Atlantic City to Spartanburg. He carried 81 gallons of gasoline in his plane.—*P. J. RINDERLE.*

James D. Phillips, right, of Big Spring, Texas, with his father and the "Cub" they flew home recently from the Piper Factory at Lock Haven, Pa. Jim is station agent for American Airlines at Big Spring, having been with that concern since 1935 after completion of a flight training course at Parks Air College. Mr. Phillips, Sr., was making his first trip by plane.

Palestine, Texas

New Flying Club Organized

The "big noise" around here this month was caused by the formation of the Palestine Flying Club. Now cruising along nicely, the Club is getting more and more members every day. Both the dual and solo time have been placed very low for the members and as a result of this, there will be quite a few new license holders here next month. Recent solo-ers include Hobby Miller, Jesse Powell, Shorty Jarrett and M. B. Cariker.

A very interesting and educational program was "taken in" by practically every citizen of Paletsine on the 22nd. Planned and sponsored by the Sessions Aircraft Service, an airplane "Safety Program," including a complete stripped down J-2 Cub, assembled, yet minus the fabric covering, proved a great success. The shops were opened and boys on hand to answer questions, etc. Aerial demonstrations and maneuvers were put on by "yours truly" and all-in-all everyone had a big time.

Old-timer Louis Stathis of Mexia has formed the Mexia Flying Club in conjunction with our club here and it, too, is a big success.

The shops are full, with work being done on Mr. Bevel's Cub "50" converting it into an advertising sound ship, and a Stinson just in from Dallas. The Cub from Center and the Great Lakes from Houston have been completed, but work is still progressing on Sid Trahan's Robin.

That's about all the news for this time, except that "Mrs. Don" should be the first girl-pilot here soon as she is learning very fast. I'll P-X out until next month.—*DON ARMSTRONG.*

Ponca City, Oklahoma

Recent Air Show Great Success
Tonkawa College Chosen in CAA Program

One of the best air shows ever held in this section of the United States was held at the Ponca City Municipal Airport on Sunday, September 17. It was preceded by a hangar dance on Saturday night, with music furnished by Jimmie Joy and his Orchestra. The dance was enjoyed by 1,200 people and hundreds were denied admission due to the crowded condition.

An estimated crcwd of 20,000 witnessed the air show the following afternoon. Comments were heard from every side that this was the best air show ever held in this part of the country. Events enjoyed by the spectators were performed by Carl Winstead in his Cessna, who demonstrated how acrobatics should be precisive maneuvers. Lynn Berentz, of Coffeyville, Kansas, thrilled the crowd with his upside-down flying in a Luscombe 50. He also won first honors in the serpentine cutting contest. Al Guthrie of Stillwater, Okla., with his crazy flying in a Cub, showed the thrilled spectators how not to fly. There were many groans from the crowd when he executed his loops just above the ground. L. M. Kelly, of Tulsa, won a beautiful trophy as first place winner in the bomb dropping contests. Ray Epperson of Bartlesville was the first across the finish line in his Luscombe 50, flying in the 50 h.p. and under race. He was closely pushed by Lynn Berentz in his Luscombe 50. In the 75 h.p. and under race, Lynn Berentz, flying a Luscombe 65, easily outdistanced the other entrants.

Johnny Erickson, a popular local pilot, suffered a broken leg from his parachute jump during the show. He made a perfect spot landing from an altitude of 3,000 feet. His leg has been placed in a cast and his doctor states he may be out on crutches in a short time.

R. O. Lindsay, C. A. A. Inspector for Oklahoma, told the officers

of the Tunderbird Aviation Club that the air show was one of the best controlled and best conducted shows he had ever witnessed.

Ralph Cooley, flying the Luscombe 50 owned by he and Okla Vanselous, attended the Pampa Air Show, where he entered and won the race for 50 h.p. planes and under.

Recent news dispatches state that the Tonkawa University has been selected by the C. A. A. as one of the state colleges affording instruction in aeronautics to its students. The local Municipal Airport will be the site of their flight instruction with Jack Mankins in charge. The officials of the college are very elated over the fact that the local airport can be used, as it has recently been improved with two new paved runways, 80 acres of additional field and other improvements.

Herb Persin, G. M. McGunkin, Jack Mankins, and Ralph Murray flew to Neosho, Mo., recently to attend a centennial celebration being held there.

C. M. Brooker, local Luscombe dealer, has gone to Trenton, N. J., to take delivery of a new Luscombe 65 purchased by Herb Brokey.

Since the completion of the new runways, the Army Air Corps has been making Ponca City a frequent over-night stop for their pilots. They all have been very high in their praise of the airport and facilities. —*RALPH D. MURRAY.*

Shreveport, Louisiana

Centenary Gets Pilot Training Program

A "Get-Together" meeting of the Shreveport Unit of the Women's National Aeronautical Association was held at Municipal Airport with NAA members as invited guests. Captain T. B. Herndon gave information about the aircraft demonstration meet to be held in New Orleans December 1, 2, and 3rd. He also told of several new aeronautical inventions being patented. John D. Lyles reported on the airline situation and Dr. Dorf Bean spoke on the physical examinations required of pilots. Claude Hamel presented his ideas on a "flying" fishing trip to be taken annually by both clubs. Bob Emery offered one hour Kinner Fleet time to be used by the unit in a membership drive—Claude Hamel followed up with another hour.

Centenary has been allotted twenty students for training under the CAA plan. Although most of the instructors have made application, the selection has not yet been made. Doug Langstaff, state superintendent of aeronautics, was up here from New Orleans looking this situation over.

Johnnie Mays soloed the Luscombe; Newt Badgett soloed John D. Lyles on his Ryan-ST; "Doc" Richardson soloed the "club" Aeronca. Bob Emery, Cliff Callihan, Ken Hunter, Newt Badgett and maybe others are studying—I don't know exactly what, but they say it has something to do with instrument and instructor ratings. The old wind tee has been reconditioned and moved and stays lighted all night. Billy Temples won the pistol offered on the junchboard Ham Titone operated. —*MARJORIE HARDMAN.*

Two Factories for Dixie

(Continued from page 7)

fense is concerned, officials said. And, as in the case of the Aviation Manufacturing Corporation's choice of Nashville for their new factory site, the Bennett interests pointed to the inland location of Fort Worth and the ideal weather conditions as fundamental elements in locating near that Texas city.

Officials of the Bennett Aircraft Corporation are D. L. Johnson, John Kennedy and R. K. Hanger of Fort Worth, Frank Bennett of Dallas, and Frank C. (Bub) Merrill, well known veteran pilot and operator who pioneered the design from its original conception through every phase of engineering, construction and testing.

The company has already had innumerable domestic inquiries in addition to many from Britain, the Scandinavian countries, France, China and Latin America. Officials of the company attribute the world-wide interest in their product not only to the performance and price but also to the growing acceptance of the type of construction employed.

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HOWARD DGA-9. 1937. 285 Jacobs, 175 hours. Plane and engine in excellent condition. Special color design, white with red trim, leather seats. Flares, landing lights, gas 127 gallons, manifold pressure, thermocouple, air temperature, carburetor temperature, full engine set, turn and bank, rate of climb plus standard instruments. Battery, generator, bonding and shielding. Plus other gadgets. $4,800.00. Perry Boswell, Jr., Mt. Rainier, Maryland.

CUB SEAPLANE. Continental dual 50, metallized, 60 hours time, sold new $2,200.00. Now, $1,825. Virginia Cub Distributors, Farmville, Virginia.

FOR SALE: Waco F, 125 hp. Kinner, majored about 80 hours back, excellent shape, licensed until July, 1940. Starter, brakes and tailwheel. $1,145.00. Paul Blackwell, 2105 Commerce, Dallas, Texas.

1932 WACO CABIN: Just relicensed, blind flying instruments, hood, 6-ply tires, generator, receiver, landing lights, starter, steel prop. $1,400.00. Odell Garrison, Muscle Shoals, Alabama.

REARWIN 1936 SPORTSTER. LeBlond 85. Airwheels, compass, brakes, air speed. Fabric refinished and motor just overhauled. Class 2S. Highest offer over $1,000. J. C. Gugel, 220 Tampa St., Tampa, Florida.

FOR SALE: 1937 Ryan STA, perfect, lots of extras, motor just majored. Special instruments, shockproof panel, blind flying hood, plastacelle military winter inclosure. Price $2,800.00. Can finance. Leonard Condit, 3211 East Morris, Wichita, Kansas.

DART—New Airplane. 130 hours total time. 90 hp. Ken Royce engine, bank and turn, elapse time clock, wheel pants, electric starter, generator, and battery, navigation lights, cabin ventilator, hand rubbed finish, looks like new. Cost $4,528.00. Bargain, $2,900.00. Dr. M. J. Renner, Goodland, Kansas.

WACO 1934—Custom Cabin 210 Continental. No time since major, sodium cooled valves, bank and turn, rate of climb, sensitive altimeter, landing lights, flares, radio receiver, starter, Hamilton steel propeller, carburetor temperature. $2,200.00. Will take trade. Amarillo Air Service, Inc., Amarillo, Texas.

1937 TAYLORCRAFT—40 hp. Gray with orange trim. Cabin heater. Just relicensed. Remarkable bargain at $695.00 F. A. F. Memphis, Tennessee. Aviation Credit Corporation, Robertson, Missouri.

DAVIS LeBLONDE 65: Just recovered and majored; new prop; ship and engine perfect. $695. Will take good used car in trade. Amarillo Air Service, Inc., Amarillo, Texas.

RYAN B-1. Large tail surfaces. Ship and engine just completely checked. Air wheels. Low hours. At $795 finance or trade. Licensed to May 1, 1940. Brayton Flying Service, Inc., Lambert Field, Robertson, Mo.

1939 DELUXE TAYLORCRAFT—Franklin 50 hp. Brakes, compass—green with red trim. An exceptional bargain at $1,225 F. A. F. Memphis, Tennessee. Aviation Credit Corporation, Robertson, Missouri.

HOWARD: Wright 320. Two-way radio; night, blind flying equipment. Engine topped. Ship refinished. Perfect condition, $7,500. Reg. Robbins, Airport, Fort Worth, Texas.

TAYLORCRAFT DELUXE 38 model, white hand rubbed finish, like new. Pants, brakes, steerable tail wheel, compass, blue leather upholstery. Will sell worth the money. C. Galoway, 3006 Hardie, Fort Smith, Arkansas.

FOR SALE: 1 J-5 Travelair 4000. Lights, starter, and turn and bank. Identified. $650.00. Spartan C-3, 210 Lycoming. Identified. $500.00. Cub J-2. Identified. $320.00. J. O. Casparis, Hampton Airport, 3002 Seevers Ave., Dallas, Texas.

AERONCA CHIEF: Continental 50, lots of extras, $1,250. Aeronca K, new March, 1938; engine completely majored, $775.00. Great Lakes 2T1A, red with cream trim; engine just topped; licensed to July, 1940, with parachute, $900.00. Curtiss Junior, licensed, $375.00. United Aero Corporation, P. O. Box 222, San Antonio, Texas.

MISCELLANEOUS

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Revision for the G. H. Q.

(Continued from page 5)

complish both tasks more efficiently and on a wider scale than ever before, authorities declare.

Pursuit will continue in its old role but with the very latest type of equipment.

REALIGNED, the tactical components of the air force, and their respective primary missions, are as follows:

1. Heavy and medium bombardment, for long and medium range operations and for use against heavy and medium objectives, respectively, while conducting independent operations or in support of the ground army and navy.

2. Light bombardment, for shorter range operations and for light objectives while supporting the ground army or conducting independent operations.

3. Pursuit aviation, to fight off bombers threatening our troops, installations and vital areas, pursuit attacking our bombardment, to deny areas to hostile reconnaissance and observation and to protect our observation and reconnaissance from hostile pursuit. As yet, no pursuit airplane of sufficient range has been designed which will enable it to operate as an escort for bombardment airplanes, authorities say. The old controversy as to the relative merits of pursuit and bombardment has had no effect upon the present setup for the GHQ Air Force.

Allotments of the three components of heavy and medium bombardment, light bombardment and pursuit, as listed above, have been based on balanced requirements rather than upon what will happen when large formations of bombers attack objectives defended by swarms of pursuit.

And 4. Long and medium range reconnaissance, for the collection of information. Accurate information of the location and disposition of enemy forces and installations is as essential to air force as it is to ground forces. The types of airplanes used for reconnaissance in the air forces are the same as for heavy and medium bombardment.

Air force organization along these lines has been necessitated, General Emmons said, by the requirements of adequate air defense.

"The adoption of counter air force tactics is the best method of defense against air attack," he explained. "Local defense by pursuit aviation and antiaircraft artillery of the most vulnerable and critical points along our coasts is not enough. Our air force must be prepared to defend our nation by destroying enemy air power at its bases and in the air."

Thus he emphasized the necessity of a tactical setup designed to keep air warfare out of America.

Submerged Engine Installations

(Continued from page 8)

rigidity is also adversely influenced by any unusual spacing. Present day construction utilizes not only the wing spars, but also the wing covering, to carry part of the load, and a fundamental feature of a structurally good wing is its continuity. However, the installation of an engine within the wing requires considerable discontinuity of the structure because it must be possible to install the engine through one of the wing surfaces. Preferably, installation access is provided through the bottom of the wing, because it is found to be less undesirable to have discontinuity in the lower surface than in the upper surface, due to compression stresses predominating in the upper surface. Adequate structure must be located in the wings to support the engine and the flight loads under all conditions simultaneously. This usually necessitates an inverted box construction with the bottom surface removable, consisting of a quickly detachable door incapable of carrying stress, with the spars for the front and rear ends of the box, and heavy compression ribs for the sides. The resulting discontinuity of the wing surface adversely affects the otherwise torsionally rigid structure which must now be obtained at the expense of special bracing around the box with a subsequent increase in weight and cost.

Ease of access to the engine and accessories is generally considered by the industry to be a necessity. However, we find that the only practical access to the engine is from below, with rather questionable access at the front and rear ends, and sides, all obtained through doors in the lower surface of the wing. Access from the upper surface of the wing must be limited to hand holes. Although accessibility in flight is of great advantage to the operator, and is a considerable safety factor, as has been proved on the Boeing Model 314 Pan American Clippers, it is practically impossible to attain in the majority of the submerged engine installations studied.

The new engines designed for submerged installations have more cylinders than our present radial engines, and are arranged differently. This, coupled with the inherent balance of the engine, considerably reduces vibration. Also, the center of gravity of the engine is located between supports rather than being ahead of the engine supports. Thus, we find the mounting of these engines to be fundamentally simple. However, these mountings cause annoying interferences with intake ducts, exhaust manifolds, coolant plumbing, supercharged air, intercooler ducts, and control mechanisms. Some engines will require dynamic type mountings which will permit large engine motions during the warming-up period. This type of mounting has a tendency to greatly complicate the mounting system, and will require additional space inside the wing for the increased motion. High speed multicylinder engines are smoother than the inherently unbalanced radial engines, but high frequency torsional and linear vibrations, which might accelerate fatigue failures, must still be insulated from the adjacent structure of the aircraft.

ONE difficulty with submerged engine installations is that the propeller usually cannot be mounted directly on the engine. The problem of transmitting power through comparatively long shafts, therefore, presents itself. The problems of combined torsional, flexural, and lineal vibrations in high-speed high-power shafting with unlimited variations of mass distribution are well known. We are not aware of an easy solution to these problems, but probably a definite propeller, shaft, and engine combination with suitable dynamic balancing of the entire combination can be developed. We believe that it will be the problem of the engine manufacturer to cooperate with the propeller manufacturer to develop definite propeller, shaft, and engine combinations, and to determine suitable mountings for the complete combinations and assemblies. Probably it would be best for the time being not to choose shaft lengths at random, but to standardize on only a few shaft lengths until some of these problems are solved. We also believe that the problems attendant to this type of installation cannot be solved except by concerted research and by full-scale tests. It is of interest to note that in many designs and shaft mountings the precessional forces due to the gyroscopic action of the propeller during maneuvers of the aircraft produce critical design loads, introducing new forces into the already complicated picture.

(Editor's Note: This article was condensed from a paper by the same title presented before the National Aircraft Production Meeting of the Society of Automotive Engineers at Los Angeles, and is published with the permission of the S. A. E.)

(To Be Concluded)

Co-Pilot Training

(Continued from page 9)

room, are charted on a graph, showing how quickly the flier was able to find his course.

After that he is given landing and take-off "checks" in regular T. W. A. equipment—the DC2 and DC3—with a captain to check his performance. Then he is assigned as first-officer on one of the big transport airliners.

The training school is under the direction of Joe Mountain, who is an expert in Link Trainer tests, with Capt. Henry Diltz and Capt. Stanley Kasper, regular T. W. A. pilots, instructing them in the airline's operations.

After getting into the cockpit as a first-officer, the fledgling airline flier—already a veteran by any other yardstick—has about three years of co-piloting ahead of him, and after about 2,500 hours of flying time he can apply for a crack at a captain's job.

The requirements for the lowest flying job in the air transport industry are so rigid that only about one out of every twelve applicants are accepted for the T. W. A. co-pilots school, and about a third of the graduates are weeded out in the first year of actual flying.

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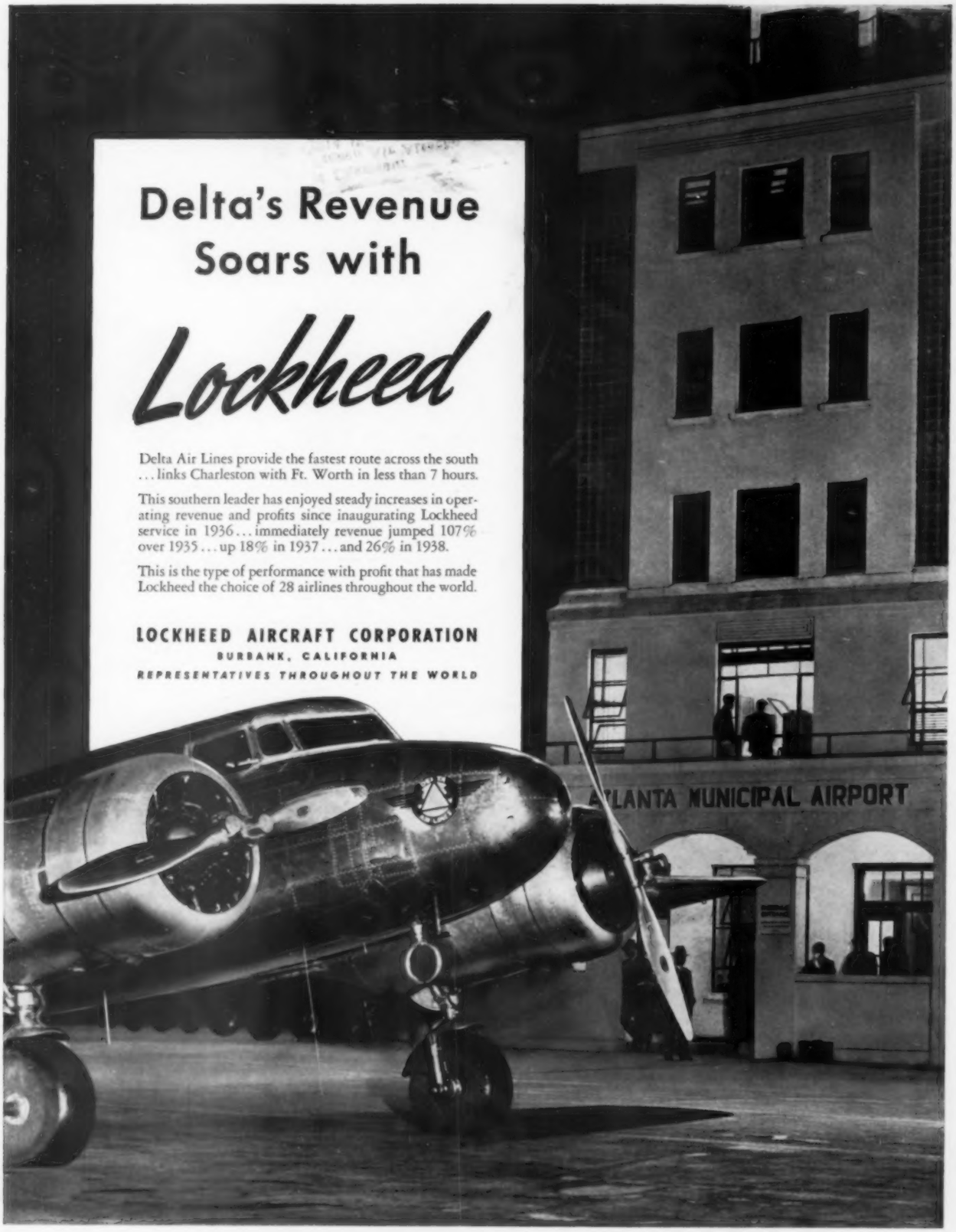
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